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COST OF COTTON INSECT CONTROL WITH INSECTICIDES AT TALLULAH, LA.

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The boll weevil (Anthonomus grandis Boheman) became resistant to the chlorinated hydrocarbon insecticides in Louisiana in the mid-1950's.[2] It became necessary for growers to use phosphorus compounds or mixtures of certain chlorinated hydrocarbons to obtain control. Until cotton growers became accustomed to coping with the situation, control costs were extremely high. Some growers reported spending more than $60 per acre on their insect control programs.

Personnel of the Cotton Insects Research Branch Laboratory at Tallulah, La., arranged with several cotton growers near Tallulah in 1957, 1958, 1959, and 1962 to obtain information on the cost and effectiveness of cotton insect control programs used in the area. Laboratory personnel made the necessary insect infestation records and made them available to the grower. The grower purchased and applied the insecticides as needed and made available to the laboratory personnel the costs of insect control and the yields. The insect control programs on the various farms included almost all the insecticides and combinations of insecticides in use at that time. In some instances it was possible to compare the cost and effectiveness of several insecticides. The insects included in the study were the boll weevil, the tobacco thrips (Frankliniella fusca (Hinds)), the tarnished plant bug (Lygus lineolaris (Palisot de Beauvois)), the bollworm (Heliothis zea (Boddie)), the cotton aphid (Aphis gossypii Glover), and the two-spotted spider mite (Tetranychus telarius (L.)). The data obtained from the growers are included in tables 1 and 2.

1957

Four early-season and fifteen mid- and late-season insecticide applications were made to 17 acres of cotton on farm 1. The early-season and some of the later treatments were applied with tractor-mounted spray equipment, but most of them were applied with an airplane. Toxaphene, endrin, and methyl parathion were applied in sprays; calcium arsenate, malathion, methyl parathion plus DDT, and benzene hexachloride plus DDT were applied in dusts. Insect control cost $45 and the yield was 551 pounds of lint per acre.

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[1] Deceased.

[2] Roussel, J. S., and Clower, D. F. Resistance to the chlorinated hydrocarbon insecticides in the boll weevil. Jour. Econ. Ent. 50: 463-468. 1957.

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Eighteen spray applications of methyl parathion plus DDT were made to 200 acres of cotton on farm 2 with a self-propelled, high clearance spray machine and an airplane. Insect control cost $42.59 and the yield was 590 pounds of lint per acre.

On farm 3, 511 acres of cotton in 10 fields were treated with various insecticides with an airplane. From 16 to 21 applications were made, with an average of 18. The treatments and the cost of control were as follows:

Field No.	Insecticide and number of applications	Cost per acre (dollars)
1	Methyl parathion plus DDT spray, 14; calcium arsenate dust, 6	31.83
2	Methyl parathion plus DDT spray, 9; calcium arsenate dust, 9	30.51
3	Methyl parathion plus DDT spray, 7; calcium arsenate dust, 12	34.06
4	Methyl parathion plus DDT spray, 12; calcium arsenate dust, 9	33.05
5	Calcium arsenate plus DDT dust, 17; parathion as needed	24.71
6	Methyl parathion plus DDT spray, 20	37.47
7	Methyl parathion plus DDT spray, 19	48.03
8	Guthion® [1] plus DDT spray, 17	64.82
9	Malathion plus DDT spray, 16	68.92
10	Methyl parathion plus endrin spray, 16	45.66

The average cost was $37.39 and the average yield was 541 pounds of lint per acre.

On farm 4, 55 acres were treated 16 times with methyl parathion plus DDT dust with an airplane at $25.62 per acre. The yield was 610 pounds of lint per acre.

The average cost of treating 783 acres on 4 farms with 18 insecticidal applications on the average in 1957 was $38.22 and the yield was 558 pounds per acre.

1958

On farm 1, 150 acres of cotton received three early-season treatments of methyl parathion plus DDT spray applied with a high clearance, self-propelled spray machine and eight late-season treatments of methyl parathion plus DDT dust applied with an airplane. Insect control cost $34.25 and the yield was 470 pounds of lint per acre.

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[1] O,O-Dimethyl S-(4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl) phosphorodithioate. Mention of a proprietary product in this publication does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture and does not imply its approval by the Department to the exclusion of other products that may also be suitable.

Farm 2 had 526 acres divided into three parts. The treatments and cost of control were as follows:

Acres	Treatment	Cost per acre (dollars)
171	Toxaphene plus DDT	42.29
163	Endrin plus methyl parathion	36.59
192	Methyl parathion plus DDT	27.18

Each part was sprayed 15 times with an airplane. The average cost of insect control was $35.34 and the yield was 596 pounds of lint per acre.

Farm 3 had 55 acres of late-planted cotton. Fourteen applications of methyl parathion plus DDT were made with an airplane. Four were applied as sprays and the remainder as dusts. Insect control cost $20.85 and the yield was 543 pounds of lint per acre.

The average cost of treating 731 acres on 3 farms with 13 applications on the average in 1958 was $34.03 and the yield was 566 pounds per acre.

1959

On farm 1, 10 acres of cotton were treated twice with calcium arsenate plus methyl parathion dust with a tractor-mounted dust machine and sprayed 11 times with methyl parathion plus DDT with an airplane. Insect control cost $25.56 and the yield was 986 pounds of lint per acre.

On farm 2, 80 acres of cotton received eight applications of methyl parathion plus DDT dust and three applications of methyl parathion plus DDT spray. All were applied with an airplane. Insect control cost $19 and the yield was 773 pounds of lint per acre.

On farm 3, 286 acres of cotton received one application each of toxaphene for thrips control and of methyl parathion for overwintered boll weevil control from a high clearance, self-propelled spray machine. Eleven late-season spray applications of methyl parathion were made--two with a high clearance, self-propelled spray machine and nine with an airplane. Two of the applications contained DDT. Insect control cost $25 and the yield was 536 pounds of lint per acre.

Farm 4 had 676 acres of cotton. Three early-season spray applications were made with ground equipment. Ten late-season applications were made with an airplane--seven consisted of endrin plus methyl parathion spray and three of calcium arsenate dust. Insect control cost $25.07 and the yield was 709 pounds of lint per acre. In 1957, insect control on this farm cost $37.39 for a yield of 541 pounds of lint per acre.

Farm 5 had 32 acres of late-planted cotton. Twelve dust applications of methyl parathion plus DDT were made with an airplane. Insect control cost $20.61 and the yield was 667 pounds of lint per acre.

The average cost of insect control on 5 farms with 1,084 acres treated with 12 applications on the average in 1959 was $24.47 and the yield was 669 pounds per acre.

1962

On farm 1, 92 acres were sprayed three times for thrips control and four times for overwintered boll weevil control with Guthion. Two spray applications of DDT were made for bollworm control in late July and three applications of Guthion plus DDT and one application of toxaphene plus DDT for boll weevil and bollworm control. Insect control cost $17.70 and the yield was 577 pounds of lint per acre.

On farm 2, 32 acres of cotton received four early-season spray applications of toxaphene plus DDT plus methyl parathion for overwintered boll weevil control and eight applications of the same material for mid- and late-season boll weevil and bollworm control. Insect control cost $20.17 and the yield was 611 pounds of lint per acre.

Farm 3 had 31 acres of cotton, which were divided into three plots. Plot 1 was treated with Guthion early in the season and Guthion plus DDT late in the season. Plot 2 was treated with Methyl Trithion®[1] (*S*-(*p*-chlorophenylthio)methyl *O,O*-dimethyl phosphorodithioate) early in the season and with the same material plus DDT late in the season. Plot 3 received toxaphene plus DDT both early and late in the season. Each plot received two spray applications for thrips control, three for overwintered boll weevil control, and five for late-season boll weevil and bollworm control. All applications were made with a high clearance, self-propelled spray machine. The cost per acre of using the various materials was as follows: Guthion and Guthion plus DDT, $15.89; Methyl Trithion and Methyl Trithion plus DDT, $15.85; and toxaphene plus DDT, $16.15. The average cost was $15.96 and the yield was 561 pounds of lint per acre.

Farm 4 had 31 acres of cotton, which were divided into three plots. The treatments and cost of control were as follows:

Plot	Treatment	Cost per acre (dollars)
1	Guthion and Guthion plus DDT	18.25
2	Methyl Trithion and Methyl Trithion plus DDT	18.75
3	Toxaphene plus DDT plus methyl parathion	16.77

Ten spray applications were made with a high clearance, self-propelled spray machine and an airplane. The airplane was used during wet weather. The average cost was $17.92 and the yield was 793 pounds of lint per acre.

Farm 5 had 160 acres of cotton in 16 fields. Spray treatments of toxaphene plus DDT and of methyl parathion plus DDT were each applied at 5- and 7-day intervals and were replicated 4 times in the 16 fields. Insecticides were applied with high clearance, self-propelled spray machines. Two applications of toxaphene plus DDT and three applications of methyl parathion were made in the appropriate plots for thrips control. In the toxaphene plus DDT plots, 11 late-season applications were made at 5-day intervals and 12 at 7-day intervals for boll weevil and bollworm control. In the methyl parathion plus DDT plots, 11 late-season applications were made at 5-day intervals and 10 at 7-day intervals. Cost per acre of the various scheduled programs was as follows: Toxaphene plus DDT at 5-day intervals, $21.16, and at 7-day intervals, $24.14; methyl parathion plus DDT at 5-day intervals, $20.12, and at 7-day intervals, $17.86. The average cost was $20.82 and the yield was 890 pounds of lint per acre.

Farm 6 had 64 acres of cotton divided into eight plots. Treatments of toxaphene plus DDT and of methyl parathion were replicated four times in the eight plots. Three applications of each material were made for thrips control and five for overwintered boll weevil control. Eight late-season applications were made for boll weevil and bollworm control. DDT was used with methyl parathion in these applications. The 16 spray applications were made with a high clearance, self-propelled spray machine and an airplane. The comparative acre cost was $23.83 for toxaphene plus DDT and $19.70 for methyl parathion and methyl parathion plus DDT. The average cost was $21.77 and the yield was 953 pounds of lint per acre.

Farm 7 had 66 acres of late-planted cotton. It was divided into three plots and treated with spray applications of carbaryl, carbaryl plus methyl parathion, and methyl parathion plus DDT. Eleven applications were made--ten with a high clearance, self-propelled spray machine and the last with an airplane. The comparative acre cost was as follows: Carbaryl, $19.68; carbaryl plus methyl parathion, $18.62; and methyl parathion plus DDT, $14.55. The average cost was $17.62 and the yield was 260 pounds of lint per acre.

Farm 8 had 306 acres. Two hundred and eighty acres received 12 spray applications of toxaphene plus DDT, with parathion added in 4 for cotton aphid and spider mite control. Twenty six acres received 10 spray applications of toxaphene plus DDT plus methyl parathion. Insecticides were applied with a high clearance, self-propelled spray machine and an airplane. Insect control cost $22.73 per acre for the 280-acre tract and $19.10 for the 26-acre tract. The average cost for both acreages was $20.92 and the yield was 808 pounds of lint per acre.

The cost of the seven insecticides or combinations of insecticides used on the individual farms ranged from $14.55 to $24.14 per acre. The average cost on the various farms ranged from $17.28 to $21.60 per acre (table 2). Differences in cost are probably not too significant because of differences in numbers of acres treated. The most acres treated, 400, was with toxaphene plus DDT and this treatment also cost the most. The only other acreages exceeding 100 were those treated with Guthion and Guthion plus DDT and with methyl parathion and methyl parathion plus DDT. The yields produced with the four most commonly used insecticides ranged from 721 to 783 pounds of lint per acre. The yield with Methyl Trithion and Methyl Trithion plus DDT was 612 pounds per acre, but only 18 acres were treated 10 times. This treatment cost less than the others, except Guthion and Guthion plus DDT. Yields given for acreage treated with carbaryl should be discounted, because the cotton on this farm was planted very late and yields were about one-third of those produced on other farms. Low yields were not caused by poor control of insects with the insecticides.

The average cost of insect control on 8 farms with 782 acres treated with 12 applications on the average in 1962 was $19.96 and the yield was 745 pounds per acre.

Discussion

It is interesting to note that the cost of control decreased in successive years and the yields increased (table 1). The only appreciable difference in the number of insecticide applications was in 1957, when 18 were used as compared with 12 or 13 in the other 3 years. Cost of control decreased from $38.22 per acre in 1957 to $19.96 in 1962. Little difference in lint yields per acre occurred in 1957 and 1958, when they were 558 and 566 pounds, respectively; however, substantial increases occurred in 1959 and 1962, when yields were 669 and 745 pounds, respectively.

The high acre cost of insect control in 1957 was affected by the large number of applications as well as by the higher cost of insecticides. Apparently the cost of insecticides was sharply reduced, especially in 1959 and 1962 over 1958. Only one more application was made in 1958 than in the other 2 years. A further decrease in 1962 over 1959 with the same number of applications indicated a very competitive insecticide market. This is illustrated by a cost in 1958 of $42.29 per acre for 15 applications of toxaphene plus DDT and $27.18 for the same number of applications of methyl parathion plus DDT. The cost in 1962 of 13 applications of toxaphene plus DDT was $21.60 and for 14 applications of methyl parathion and methyl parathion plus DDT, $18.06 per acre. The cost of applying insecticides was about the same for all years--4 cents per pound for dust applications with an airplane, 75 cents per acre for spray applications with an airplane, and 50 cents per acre for spray or dust applications with ground equipment.

In a study reported by Langsford,[3] cotton insect control in the delta areas of Louisiana in 1961 cost $16.60 per acre. This compares favorably with $19.96 per acre in 1962 in this study. Usually more thorough insect control practices are used in the Tallulah area than in the other delta areas of this State.

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[3] Langsford, E. L. Extent and cost of using chemicals in cotton production selected areas, 1961. U.S. Dept. Agr. ERS-155, 15 pp. 1964.

Table 1.—Cost of cotton insect control with insecticides and yield of lint, Tallulah, La., 1957, 1958, 1959, and 1962

Farm No.	Acres Treated	Applications	Cost of insecticides and their application per acre	Yield of lint per acre	Cost per pound of lint
	Number	Number	Dollars	Pounds	Cents
			1957		
1	17	19	45.00	551	0.082
2	200	18	42.59	590	.072
3	511	18	37.39	541	.069
4	55	16	25.62	610	.042
Total or average	783	18	38.22	558	.068
			1958		
1	150	11	34.25	470	0.073
2	526	15	35.34	596	.059
3	55	14	20.85	543	.038
Total or average	731	13	34.03	566	.06
			1959		
1	10	13	25.56	986	0.026
2	80	11	19.00	773	.025
3	286	13	25.00	536	.047
4	676	13	25.07	709	.035
5	32	12	20.61	667	.031
Total or average	1,084	12	24.47	669	.036
			1962		
1	92	13	17.70	577	0.031
2	32	12	20.17	611	.033
3	31	10	15.96	561	.028
4	31	10	17.92	793	.023
5	160	11	20.82	890	.023
6	64	16	21.77	953	.023
7	66	11	17.62	260	.068
8	306	11	20.92	808	.026
Total or average	782	12	19.96	745	.027

Table 2.--Average cost of cotton insect control with various insecticides and combinations of insecticides and yield of lint, Tallulah, La., 1962

Insecticide	Farms	Acres treated	Applications	Cost per acre	Yield of lint per acre
	Number	Number	Number	Dollars	Pounds
Guthion Guthion plus DDT	3	111	11	17.28	721
Methyl parathion Methyl parathion plus DDT	3	128	14	18.06	783
Methyl Trithion Methyl Trithion plus DDT	2	18	10	17.30	612
Toxaphene plus DDT	4	400	13	21.60	762
Toxaphene plus DDT plus methyl parathion	3	75	11	18.68	748
Carbaryl	1	25	11	19.68	290
Carbaryl plus methyl parathion	1	25	11	18.62	156

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